UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,938	09/27/2001	David F. Lowry	50005-44	2207

32215 7590 12/28/2005

KLARQUIST SPARKMAN, LLP
121 SW SALMON STREET, SUITE 1600
ONE WORLD TRADE CENTER
PORTLAND, OR 97204

EXAMINER	
STEVENS, THOMAS H	

ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 12/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/964,938	LOWRY, DAVID F.	
	Examiner	Art Unit	
	Thomas H. Stevens	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/11/05*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-37 were previously examined.

2. Claim 38 was added.

3. Claims 1-38 were examined.

Section I: Non-Final Office Action (2nd Office Action)

Information Disclosure Statement

4. The information disclosure statement filed 10/11/05 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. Copies of the following documents were not provided: "Reduced Multidimensional NMR Using a Linear Least-Squares Procedure"; "Technique for Importing Greater Evolution Resolution in Multidimensional NMR Spectrum"; "Nonuniform Sampling in NMR Experiments"; and Internet website for 6/05/2001.

Claim Interpretation

5. Office personnel are to give claims their **"broadest reasonable interpretation"** in light of the supporting disclosure. *In re Morris,* 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *In re Prater,* 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551(CCPA 1969). See *also *In re Zletz,* 893 F.2d 319, 321-22, 13

USPQ2d 1320, 1322(Fed. Cir. 1989) ("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow") .... The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed .... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process. The examiner interprets mutually exclusive as dissimilar by deviation and/or magnitude within the context of this genre . Dictionary.com defines regression as less serve.

Claim Objection

5. Claim 35 is objected to because of the following informalities: The word "extremizing" does not exists. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1-38 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification (page 2, lines 16-17; page 7, lines 3-4 and 11-12, respectively), for

example, states, *"In one refinement **the term is selected** by fitting (column 7 and 8, lines 45-50 and 16-20, respectively with claim interpretation regarding regression) the model in a third spectral data set….Following action 110, **action 120 calls for an analysis** of the obtained 2D projections to determine significant features of the projections… **Once determined**, the features of the 2D projections are correlated by matching feature pairs in action 130"* is unclear as whether the computer (column 37, line 32) or an outside agency is conducting the processes.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-38 are rejected under 35 U.S.C. 102(b) as being anticipated by Dunkel (US Patent 5,572,125). Dunkel discloses n-dimensional spectral and imaging data events (abstract).

Claim 1. A method comprising: forming a model of multi-dimensional spectroscopic information including at least one set of two or more mutually exclusive (column 8, lines 25-28 since heterogeneous signals are mutually exclusive) terms, the set of terms formed from at least first and second multi-dimensional spectroscopic data sets (column 8, lines 52-56) of a dimension less than the modeled multi-dimensional information, selecting only one of the set of mutually exclusive (column 8, lines 25-28 since

heterogeneous signals are mutually exclusive) terms to represent the multi-dimensional spectroscopic information by fitting (column 7 and 8, lines 45-50 and 16-20, respectively with claim interpretation regarding regression) the model to a third multi-dimensional spectroscopic data set.

Claim 2. The method of claim 1 wherein the first and second data sets (column 8, lines 52-56) share a common dimension and the second data set has at least one dimension orthogonal (column 4, line 6) to a dimension the first data set.

Claim 3. The method of claim 2 wherein the orthogonal (column 4, line 6) dimensions are frequency (column 2, line 5) dimensions and wherein the set of mutually exclusive (column 8, lines 25-28 since heterogeneous signals are mutually exclusive) terms include frequency (column 2, line 5) and decay (column 12, line 46) rates determined from the first and second data sets (column 8, lines 52-56).

Claim 4. The method of claim 1 further comprising representing the multi-dimensional information (column 7, lines 35-44 and column 8, lines 4-13) with a model including only the selected term of the set of mutually exclusive terms.

Claim 5. The method of claim 1 wherein the set of mutually exclusive (column 8, lines 25-28 since heterogeneous signals are mutually exclusive) terms include frequency

(column 2, line 5) and decay (column 12, line 46) rates determined from the first and second data sets (column 8, lines 52-56).

Claim 6. The method of claim 5 wherein the first and second data sets (column 8, lines 52-56) are of dimension one less than the third data set.

Claim 7. The method of claim 6 wherein the third data set is an NMR (column 1, line 23) spectrum.

Claim 8. The method of claim 7 wherein the third data set is a protein (column 33, line 61) NMR (column 1, line 23) spectrum.

Claim 9. The method of claim 1 wherein the third data set is obtained at lower resolution (column 5, lines 64-65) than the first and second data sets (column 8, lines 52-56).

Claim 10. The method of claim 1 further comprising: obtaining peak frequencies (column 16, lines 3-5) and associated decay (column 12, line 46) rates from the first and second data sets (column 8, lines 52-56), and forming the set of mutually exclusive terms with the obtained frequencies and associated decay (column 12, line 46) rates.

Claim 11. A method of analyzing a physical object comprising: providing a series of stimuli to the object and determining the response of the object to the series of stimuli,

varying the times between the stimuli in the series to form at least first and second multi- dimensional data sets (column 8, lines 52-56) of the response of the object to the series of stimuli, forming a model of multi-dimensional information of a dimension higher than the dimension of the first or second data sets (column 8, lines 52-56), the model including at least one set of terms where each term in the set represents a potential correlation (column 41, lines 1-3) between features of the first and second data sets (column 8, lines 52-56), determining which term in the set represents the actual correlation (column 41, lines 1-3) between features of the first and second data sets (column 8, lines 52-56) by comparing the model to a third multi-dimensional data set.

Claim 12 The method of claim 11 wherein the features of the first and second data sets (column 8, lines 52-56) include frequency (column 2, line 5) and decay (column 12, line 46) rates.

Claim 13. The method of claim 11 further comprising representing the multi-dimensional information with a model including the term determined to be representative of the correlation (column 41, lines 1-3) of features

Claim 14. The method of claim 11wherein providing the series of stimuli and varying the times between the stimuli include performing a multi-dimensional NMR (column 1, line 23) analysis of the object.

Claim 15. The method of claim 11wherein the formed model includes a plurality of sets of terms, and the method further comprises selecting one from each of the sets of terms to represent the actual correlation (column 41, lines 1-3) of features in the first and second data sets (column 8, lines 52-56).

Claim 16. The method of claim 11 wherein the object is a protein (column 33, line 61).

Claim 17. The method of claim 16 wherein the protein (column 33, line 61) is a heteronuclear labeled protein (column 33, line 61).

Claim 18. A device comprising: a computer (column 37, line 32) readable media containing programming instructions for a multidimensional interrogation device, the instructions operable to cause the multidimensional interrogation device to; form a model of multi-dimensional interrogation information including at least one set of terms where each term represents a potential correlation (column 41, lines 1-3) between features of at least first and second multi-dimensional data sets (column 8, lines 52-56), the first and second data sets (column 8, lines 52-56) of a dimension less than the modeled information, and determine which term represents the actual correlation (column 41, lines 1-3) between features of the first and second data sets (column 8, lines 52-56) by comparing the model to a third multi-dimensional data set.

Claim 19. The device of claim 18 wherein the instructions are operable to cause the interrogation device to fit the model to the third multi-dimensional data set to determine which term represents the actual correlation (column 41, lines 1-3) between features.

Claim 20. The device of claim 19 wherein the features of the first and second data sets (column 8, lines 52-56) include peak frequencies (column 16, lines 3-5) and associated decay (column 12, line 46) rates.

Claim 21. The device of claim 18 wherein the computer (column 37, line 32) readable media is selected from the group consisting of floppy disks, magnetically encoded hard disks, tapes, cartridges and optical disks.

Claim 22. The device of claim 21 wherein the multi-dimensional interrogation device includes a multi-dimensional NMR (column 1, line 23) machine.

Claim 23. he device of claim 22 wherein the features of the first and second data sets (column 8, lines 52-56) include peak frequencies (column 16, lines 3-5) and associated decay (column 12, line 46) rates of multi-dimensional NMR (column 1, line 23) data sets (column 8, lines 52-56).

Claim 24. A method comprising: forming at least one set of terms from at least first and second multi-dimensional spectroscopic data sets (column 8, lines 52-56) wherein each of the terms in the set is representative of potential correlation (column 41, lines 1-3)s

between features in the first and second data sets (column 8, lines 52-56), determining which of the set of terms represents the actual correlation (column 41, lines 1-3) between features of the multi-dimensional data sets (column 8, lines 52-56) by comparing the model to a third multi-dimensional spectroscopic data set, representing multi-dimensional spectroscopic information with the determined term.

Claim 25. The method of claim 24 wherein determining which term represents the actual correlation (column 41, lines 1-3) between features includes fitting (column 7 and 8, lines 45-50 and 16-20, respectively with claim interpretation regarding regression) the model to the third multi-dimensional data set.

Claim 26. The method of claim 24 wherein the features of the first and second multi-dimensional data sets (column 8, lines 52-56) include peak frequencies (column 16, lines 3-5) and associated decay (column 12, line 46) rates.

Claim 27. The method of claim 24 wherein the at least first and second multi-dimensional spectroscopic data sets (column 8, lines 52-56) include NMR (column 1, line 23) data sets (column 8, lines 52-56).

Claim 28. The method of claim 27 wherein the NMR (column 1, line 23) data sets (column 8, lines 52-56) are data sets (column 8, lines 52-56) from NMR (column 1, line 23) analysis of biological material.

Claim 29. The method of claim 24 wherein the third data set is obtained at lower resolution (column 5, lines 64-65) than the first and second data sets (column 8, lines 52-56).

Claim 30. An apparatus comprising: a device carrying logic to: form a model of multi-dimensional information wherein the model includes at least one set of terms where each term represents a potential correlation (column 41, lines 1-3) between features in at least first and second multi-dimensional data sets (column 8, lines 52-56) of a dimension less than the modeled information, (columns 13 and 14, lines 65-67, and 1-6) select one of the set of terms for representing the multi-dimensional information by comparing the model to a third multi-dimensional data set.

Claim 31. The apparatus of claim 30 wherein the device also carries logic to determine the features in the first and second data sets (column 8, lines 52-56).

Claim 32. The apparatus of claim 30 wherein the device is a computer (column 37, line 32) readable memory (column 40, line 44-49) device.

Claim 33. The method for determining multi-dimensional information concerning an object, comprising: forming first and second multi-dimensional data sets (column 8, lines 52-56) representing projections of information concerning an object of a dimension one

higher than the first and second data sets (column 8, lines 52-56); correlating the first and second data sets (column 8, lines 52-56) to form a model of the multidimensional information concerning the object, the model including at least one set of terms where each term in the set represents a potential correlation (column 41, lines 1-3) between features in the first and second data sets (column 8, lines 52-56); determining which of the terms represents the actual correlation (column 41, lines 1-3) of features in the first and second data sets (column 8, lines 52-56) by comparing the model to a third multi-dimensional data set representing information concerning the object.

Claim 34. The method of claim 33 wherein the third data set is obtained at lower resolution (column 5, lines 64-65) that the first and second data sets (column 8, lines 52-56).

Claim 35. The method of claim 1 wherein fitting (column 7 and 8, lines 45-50 and 16-20, respectively with claim interpretation regarding regression) the model to a third multi-dimensional data set includes extremizing an error term quantifying the difference between data from the third data set and the modeled multi-dimensional spectroscopic information.

Claim 36. The method of claim 35 wherein fitting (column 7 and 8, lines 45-50 and 16-20, respectively with claim interpretation regarding regression) the model includes performing a linear least squares (column 29, line 29) fit.

Claim 37. The method of claim 11 wherein the term representing the actual correlation (column 41, lines 1-3) between feature of the first and second data sets (column 8, lines 52-56) is determined by minimizing a term quantifying the difference between data from the third data set and corresponding output of the modeled information.

Claim 38. The method comprising: obtaining a first multi-dimension spectroscopic data set and a second multi-dimensional spectroscopic data set having a predetermined dimension (column 7, lines 35-44); identifying a set of two or more mutually exclusive (column 8, lines 25-28 since heterogeneous signals are mutually exclusive) terms based on the first data set and the second data set; forming a model of multi-dimensional spectroscopic information including the set of two or more mutually exclusive (column 8, lines 25-28 since heterogeneous signals are mutually exclusive) terms; obtaining a third multidimensional spectroscopic data set having the predetermined dimension (column 33, lines 57-67); fitting (column 7 and 8, lines 45-50 and 16-20, respectively with claim interpretation regarding regression) the model to the third multi-dimensional spectroscopic data set; and selecting only one of the set of mutually exclusive (column 8, lines 25-28 since heterogeneous signals are mutually exclusive) terms to represent the multi-dimensional spectroscopic based on the fitting (column 7 and 8, lines 45-50 and 16-20, respectively with claim interpretation regarding regression).

Section II: Response to Applicant's Arguments (1st Office Action)

10. Applicant's arguments, see pages 10-11 and 17-18, filed 11/10/05, with respect to the rejections of claims 1-10 under 35 U.S.C. 102(b) under Felix and claims 34-35 the 35 U.S.C. 103(a) under Felix and Anderson have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground of rejection is made for all claims in view of Dunkel.

Applicant's alleges the Dunkel reference fails to teach potential correlation between first and second data sets (applicant's response pg. 12 of 18, lines 12-13). Firstly, the reference teaches a plurality of signals representing data (Dunkel: column 8, line 52); the correlation limitation is defined as a *causal, complementary, parallel, or reciprocal relationship, especially a structural, functional, or qualitative correspondence between two comparable entities* to which the signals a similar property. The specification (pg. 7, lines 11-13) states, "*...2D projections are correlated by matching feature pairs in action 130. The preferred method to correlate features is to match a common coordinate value of the various features along a common axis of the 2D projections*" to which is not dissimilar to the method Dunkel is applying (columns 7 and 8, lines 66-67 and 1-30, respectively (emphasis underlined)):

The mathematical model used will depend upon the data to be corrected and the information desired to be extracted from the data. The preselected parameters to be initially estimated will depend upon the model used. In the simplest cases, where the data to be corrected or analyzed is expected to consist of a plurality of separate, single,

substantially homogeneous signals, the expected shape of such signals after correction is usually known and can be described mathematically as a known function such as a Lorentzian, Gaussian, sinc function, or convolutions thereof. Thus, the mathematical model used to define the experimental spectral data will define such data as a combination of the absorption mode and dispersion mode components of the expected corrected shapes to calculate a resultant signal as close as possible to the experimental data. If some of the signals in the experimental data are made up of overlapping signals, the single line model will not work well to describe such signals. If the overlapping signals are made <u>*up of two or more substantially homogeneous signals which overlap and display distinct maxima for each of the overlapping signals,*</u> *an* <u>*overlap model can be used to analyze such signals to take into account the overlap of the component signals*</u>*. Finally, if a signal is substantially broadened without discernible maxima for essentially all of the component signals, as is usually the case with imaging data, such signals can be modeled using a more complex mathematical model which decomposes the signal into many overlapping signals.* <u>*Such a decomposition model can be used to describe virtually all signals, whether a heterogeneously broadened signal or merely one or more single signals.*</u> *Such models may be used for determining a wide* variety of parameters, such as distortion parameters, <u>*scaling parameters, position parameters,*</u> and lineshape parameters.

Applicant argues that the Dunkel reference is silent to "concerning forming a model of multi-dimensional information of a dimension higher than that of the first data set and a second data set" (applicant's response, page 13 of 18). The examiner

assumes the "higher dimension" is the 3rd dimensional data set. If the case, the Dunkel reference does teach higher multidimensional sets (Dunkel: column 33, line 59)

Applicant argues that the Dunkel reference is silent to "a model of multi-dimensional interrogation information including at least one set of terms where each term represents a potential correlation between features of at least first and second multi-dimensional data sets by comparing the model to a third multi-dimensional data set" (applicant's response pg.14 of 18, 1st paragraph). In response, the examiner points column 37, lines 30-40 of which Dunkel teaches a spectral data model within a computer device automatically or "interrogates" estimating preselected model parameters of at least one signal in the obtained spectral data. Furthermore, as stated previously, the 1st and 2nd data multi-dimensional spectra data sets encompass the n-multi-dimensional spectra data set taught by Dunkel (column 33, lines 55-67). The same rebuttal applies to applicant's arguments to claim 24 on page 14 and 15 of 18 2nd paragraph.

Applicant argues Dunkel's failure to teach claim 30 limitations (applicant's response, pg. 15 and 16 of 18). Examiner points to columns 13 and 14, lines 65-67, and 1-6 of Dunkel by which discloses using less demanding analysis approaches for first and second multidimensional data through the analysis of lower dimensional data.

For arguments to claim 30 are readdressing the Dunkel's alleged lack of teaching of higher dimensions, potential correlation between features in the first and second data sets and comparing the model to the third mulit-dimensional data sets, to which were

previously addressed within applicant's response to arguments section of this office action.

The arguments to claim 38 are irrelevant since claim 38 was non-existent prior to the first office action.

The rejection stands.

Information Disclosure Statement

11. Applicant is thanked for addressing this issue. Action will be taken .

Citation to Relevant Prior Art

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: US Patent 5,881,728, which teaches resonance angiography with artifact suppression.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mr. Tom Stevens whose telephone number is 571-272-3715, Monday-Friday (8:00 am- 4:30 pm EST).

If attempts to reach the examiner by telephone are unsuccessful, please contact examiner's supervisor Mr. Leo Picard ((571) 272-3749). The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status

information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov.. Answers to questions regarding access to the Private PAIR system, contact the Electronic Business Center (EBC) (toll-free (866-217-9197)).

December 19, 2005

TS

Paul L. Rodriguez 12/22/05
Primary Examiner
Art Unit 2125